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ABSTRACT

A study was conducted to investigate the ability of children to determine meanings of derived words that have undergone a pronunciation shift while retaining a close orthographic relationship to their base words. A researcher-designed test was constructed using derived words that had their base word included in a "core list" of words at or below the third grade level. Two forms of the test, a visual form and an auditory form, were developed. The visual form was administered to 105 third and 127 fifth grade students, and the auditory form was given to 94 third and 96 fifth grade students. The relationship of each student's ability to determine meaning and his or her performance on a standardized reading measure was also examined. The results indicated that children could utilize graphic information to determine meanings of derived words. In addition, both third and fifth grade students were better able to discover meanings when the derived words were received visually than when they were received auditorily. The findings also suggested that good readers at both grade levels were better able to utilize lexical information conveyed in the orthography in determining meanings of derived words. (FL)

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THE DIFFERENTIAL EFFECTS OF
VISUAL AND AUDITORY INFORMATION IN
DETERMINING MEANINGS OF DERIVED WORDS
AT THIRD AND FIFTH GRADE LEVELS

by

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Purpose of the Study

The primary purpose of this study was to investigate the ability of children to determine meanings of derived words which have undergone a pronunciation shift while retaining a close orthographic relationship to their base words. The ability to determine meaning using graphic information (the written word) was compared to ability to determine meaning using auditory information (the spoken word). This ability was examined developmentally in each modality by examining the performance of third graders and fifth graders. The relationship between the child's ability to determine meaning and his/her performance on a standardized reading measure was also examined.

Review of the Literature

The relationship of the phonetic and orthographic properties of language and consequent implications for reading and spelling is a continuing issue. A great deal of concern is directed toward the regularity of phoneme-grapheme correspondence. Chomsky and Halle (1968) asserted that English orthography does not reflect the sounds produced when words are actually spoken (phonetic representation), but rather reflects the underlying forms of the meaningful units making up these words (their lexical representation).

The "irregularity" of the phoneme-grapheme correspondence of English words is often a product of a pronunciation shift

when suffixes are added. These shifts can include vowel alternation (nation/national, extreme/extremity, wide/width), consonant alternations (medical/medicine, revise/revision, right/righteous), and the interrelated features of stress shift and vowel reduction (photograph/photography, telegraph/telegraphy). A writing system which employs a strict phoneme-grapheme correspondence would obliterate the lexical relationships of thousands of English words (C. Chomsky, 1970; Gleitman & Rozin, 1977) and would add unneeded phonetic detail. Phonological rules govern the pronunciation of these derived words. These general rules become internalized and automatic for native speakers according to Chomsky and Halle. Phonetic variation is not indicated in the spelling when it is predictable by general rules (Venezky, 1967). This permits identification at the lexical level and serves a semantic function.

A controversial aspect included in Chomsky and Halle's theory is that morphologically related words are not stored in the internal lexicon as separate units, but rather are derived from a single lexical item. Richardson (1977) and Steinberg (1973) challenge this transformational account of lexical derivation.

The emerging view that phonological competence is developed through exposure to, and is preceded by an awareness of, the orthographic representation of derivational forms (Moskowitz, 1973; Templeton, 1979a, 1979b) supports the

psycholinguistic view that decoding to sound is not necessary to get to meaning (Smith, 1973).

Various lexical decision tasks have been employed in attempts to determine how the reader gains access to the word's entry in the internal lexicon to gain meaning. Studies present mixed findings, but there are data which favor the view that fluent readers need not use phonetic information to access meaning and that visual access may be preferred (Kleiman, 1975; Lazerson, 1974-75). Barron and Baron (1977) examined this process developmentally and concluded "that even children who have had slightly less than a year of formal reading instruction are able to use graphemic information to go directly to the meanings of printed words" (p. 48).

Ehri (1978) suggested that proficient reading is enhanced by amalgamating syntactic and semantic identities of words to their graphic form. In her view, this is facilitated by programs which teach beginning readers an awareness of the full linguistic identities of words. It is hypothesized in the literature that proficient readers are able to perceive the lexical identities conveyed in the orthography of derived words and are able to use this information to directly access meaning. The present study attempted to explore the question of what young children, who have had limited experience with many of these words in either spoken or written form, do when they meet these words in print.

Design of the Study

A researcher-designed test was constructed using derived words that had their base word included in Harris and Jacobson's (1972) "core list" at or below third grade level. An additional criterion was that the derived word was not included in the core list at or below third-grade level. A multiple-choice format was used with an attempt to keep reading difficulty of the definitions and the distractors a minor issue. Two forms of the instrument were developed and tested in a pilot study. The Visual Form of the test included the derived words presented graphically. The Auditory Form used the same format except that the printed form of the derived word was omitted and was supplied orally by the examiner.

The final two forms of the test instrument consisted of 34 test items. The Visual Form of the test was administered to 105 third and 127 fifth grade students. The Auditory Form was administered to 94 third and 96 fifth grade students. The sample was obtained from a middle-income suburban school district. Results from the Metropolitan Achievement Test (Total Reading standard score), administered the preceding spring by the school district, were used in the analysis.

When the two forms of the test were administered, the children were encouraged to be "detectives" and to try to decide which meaning was best for each word. The subjects were requested to answer every item. The test was untimed

and items were repeated as needed during the administration of the Auditory Form.

Findings

A preliminary one-way analysis of variance indicated that there was no statistically significant difference between the means of the Auditory groups and the Visual groups on the Metropolitan Achievement Test. The $F(1,375) = 1.691$ was below the critical $F(1,375) = 3.84$ at the .05 level of significance.

The first three null hypotheses were tested by a two-way analysis of variance. The first null hypothesis stated that there is no significant difference between mean test scores of the Visual Form and the Auditory Form of the test at the third grade level. The second null hypothesis tested stated that there is no significant difference between mean test scores of the Visual Form and the Auditory Form of the test at the fifth grade level. On the basis of the data, these null hypotheses were rejected. The main effect had an $F(1,415) = 15.865$ which was above the critical $F(1,415) = 6.70$ at the .01 level of significance.

The third null hypothesis stated that there is no significant interaction between grade level and mode of presentation of the test. The data failed to reject this null hypothesis. There was no significant interaction between the grade level and the mode of presentation of the test. The interaction

effect had an $F(1,415) = 1.464$ which was below the critical $F(1,415) = 6.70$ at the .01 level of significance.

The mean test scores for the Visual Form of the test were higher than the Auditory Form of the test at both the third and fifth grade levels and the differences were statistically significant. The mode of presentation had a similar effect at each grade level, although the mean difference was greater for third graders than for fifth graders. This difference was not significant.

To test the remaining null hypotheses correlation coefficients were calculated between the variables of grade level (third and fifth) and test form (Auditory and Visual), and the Total Reading standard scores from the Metropolitan Achievement Test. There was a significant positive correlation between performance on the Visual Form of the test and reading achievement as measured by the Metropolitan Achievement Test at the third grade level, $r = 0.7411$, $p < .001$.

There was a significant positive correlation between performance on the Auditory Form of the test and reading achievement as measured by the Metropolitan Achievement Test at the third grade level, $r = 0.5406$, $p < .001$.

There was a significant positive correlation between performance on the Visual Form of the test and reading achievement as measured by the Metropolitan Achievement Test at the fifth grade level, $r = 0.7243$, $p < .001$. There was no significant

correlation between performance on the Auditory Form of the test and reading achievement as measured by the Metropolitan Achievement Test at the fifth grade level, $r = 0.1537$.

The data indicated that performance on both forms of the test was related to reading achievement at the third grade level. However, the correlation between reading achievement and the Visual Form was higher than between the Auditory Form and reading achievement. At the fifth grade level, performance on the Visual Form of the test was related to reading achievement, while there was no relationship between performance on the Auditory Form of the test and reading achievement.

Conclusions

Data from this study favor the view that children can utilize graphic information to determine meanings of derived words. Both third and fifth grade subjects were better able to determine meanings when the derived words were received visually than when the same words were received auditorily.

Although this study did not control for "decoding to sound," it was demonstrated that subjects provided with the orthographic representation of the word were better able to determine correct meanings of the selected derived words than those subjects who were provided only with the phonological representation of the same words. It can be inferred that the children in this study were able to utilize information in the orthographic representation of derived words to determine

meanings. It can be further inferred that these children were able to use the lexical information conveyed in the orthography of these words and that their correct responses were in fact predictions based on their knowledge of the more familiar base forms of the derived words.

Based on the correlation study, it can be inferred that good readers at both the third and fifth grade levels were better able to utilize lexical information conveyed in the orthography in determining meanings of derived words. It could be postulated that the better readers were less concerned about pronunciation and more willing to gamble to get meaning from printed language.

The fact that for third graders both the use of auditory and visual information were related to reading achievement may be indicative of the common factor of intelligence operating at this level. It should be noted that the relationship was stronger for the Visual group. At the fifth grade level use of graphic information retains a strong relationship with reading achievement. This relationship is not maintained for the Auditory group. For the older children, there seems to be a divergence of the two modes of representing language in their relationship to reading achievement.

Implications

A more complete examination of this issue should include other grade levels and other populations. To validate the

findings of this study it would be necessary to employ the same procedures and instruments with subjects who are matched on other variables in addition to reading achievement. An alternate measure of reading ability, such as an individually administered reading test or an informal reading inventory, may be a more valid indication of ability. Future studies could also include a correlation study using reading subskills to examine if some skills are more significant than others when related to ability to determine meanings of the type of derived words discussed in this study.

Although words chosen for this study were not in Harris and Jacobson's (1972) core vocabulary for the fifth grade level, the researcher felt that fifth graders had been exposed to many of the words, both in their spoken and written form. The findings for the fifth grade level are thus not as clearly indicative of what this age group may do when they meet, in print, unfamiliar words which bear an orthographic relationship to familiar base words. It was suggested that alternate words, less familiar to this group, would more clearly answer questions about effects of graphic information in determining meanings of derived words at this grade level.

This study involved words in isolation. The results cannot be assumed to be applicable to reading connected text. It is hypothesized that context would provide additional linguistic cues which would aid in determining meanings of the words in question, in both the visual and the auditory modality.

A major implication from the literature and the results of this study was the need for teachers to be aware of, and able to reinforce, the psycholinguistic nature of the reading process. Included is an acceptance of the child's ability to form hypotheses and test them using a variety of inputs. Classroom practices can focus on creating an increasing awareness of the regularity of English orthography, with potential for increasing reading and writing skills, as well as language development. Many words can be spelled systematically on the basis of their morphemic properties rather than pronunciation. Etymological information about the origin and history of a word can help the child understand more fully the rationale behind the spelling and provide a tool for developing a sensitivity to language as a living entity with a dynamic history (Kohl, 1967).

It is argued that systematic learning of English spelling, because it preserves the identity of morphemes, may prove a valuable aid in the development of general linguistic competence (C. Chomsky, 1970). The present study suggests that third grade is not too early to begin bringing children to an awareness of lexical identities of words.

It would seem advantageous for teachers to become sensitive to regularities of the English language which may not have occurred to them before. This can take place through informed search, as well as spontaneous exploration of language with children when opportunities present themselves in the classroom.

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